Claims

What is claimed is:

1. A method for implementing automated detection of excess aggressor shape capacitance coupling in printed circuit board (PCB) layouts comprising the steps of:

receiving a PCB design file containing an electronic representation of a printed circuit board design;

identifying a list of candidate shapes, said candidate shapes disposed on layers adjacent to power planes;

calculating a capacitance coupling the candidate shapes to adjacent noise-generating planes, and

determining a ratio of each said calculated coupling capacitance and a decoupling capacitance connecting the respective candidate shape to a reference plane.

2. A method for implementing automated detection of excess aggressor shape capacitance coupling as recited in claim 1 includes the step of sorting said determined ratios and providing a ranked list of shape names using said sorted ratios.

3. A method for implementing automated detection of excess aggressor shape capacitance coupling as recited in claim 2 wherein the step of providing said ranked list of shape names includes providing said ranked list of shape names with said determined ratio, an area, and a location of said shapes.

4. A method for implementing automated detection of excess aggressor shape capacitance coupling as recited in claim 1 wherein the step of identifying said list of candidate shapes includes identifying said candidate shapes disposed on layers adjacent to power planes and having an assigned name that indicates usage for power distribution.

5. A method for implementing automated detection of excess aggressor shape capacitance coupling as recited in claim 1 wherein the step of calculating said effective capacitance coupling the candidate shapes to adjacent noise-generating planes includes the steps of identifying an overlap area of the candidate shapes to each adjacent noise-generating plane.

6. A method for implementing automated detection of excess aggressor shape capacitance coupling as recited in claim 5 includes the step of identifying data from said received PCB design file representing a distance between the candidate shapes and said adjacent noise-generating planes and permittivity of the dielectric layers.

7. A method for implementing automated detection of excess aggressor shape capacitance coupling as recited in claim 1 wherein the step of calculating said effective capacitance coupling the candidate shapes to adjacent noise-generating planes includes the steps of calculating an inter-layer parallel-plate effective capacitance represented by:

$$Cpp = eA/D$$

where,

A = Plane and candidate shape overlap area (Meter^2)

e = er*eo, where er represents relative permittivity

eo equals a predefined constant value Farads/Meter; (permittivity of free space)

D = the distance (Meters) between the candidate shape and the adjacent plane.

8. A method for implementing automated detection of excess aggressor shape capacitance coupling as recited in claim 1 wherein said determined ratio of each said calculated effective capacitance and said decoupling capacitance connecting the respective candidate shape to a reference plane is used to produce a ranked list of the candidate shapes for user review.

9. A computer program product for implementing automated detection in a computer system of excess aggressor shape capacitance coupling in printed circuit board (PCB) layouts, said computer program product including instructions executed by the computer system to cause the computer system to perform the steps of:

receiving a PCB design file containing an electronic representation of a printed circuit board design;

identifying a list of candidate shapes, said candidate shapes disposed on layers adjacent to power planes;

calculating an effective capacitance coupling the candidate shapes to adjacent noise-generating planes, and

determining a ratio of each said calculated effective capacitance and a decoupling capacitance connecting the respective candidate shape to a reference plane.

10. A computer program product for implementing automated detection as recited in claim 9 includes the steps of sorting said determined ratios and providing a ranked list of shapes including a shape name, said ratio, an area, and a location.

11. A computer program product for implementing automated detection as recited in claim 9 wherein the step of identifying said list of candidate shapes includes identifying said candidate shapes having a predefined assigned name indicating usage.

12. A computer program product for implementing automated detection as recited in claim 9 wherein the step of calculating said effective capacitance coupling the candidate shapes to adjacent noise-generating planes includes the steps of calculating an inter-layer parallel-plate effective capacitance represented by:

$$Cpp = eA/D$$

where,

A = Plane and candidate shape overlap area ($Meter^2$)

e = er*eo, where er represents relative permittivity

eo equals a predefined constant value Farads/Meter; (permittivity of free space)

D = the distance (Meters) between the candidate shape and the adjacent plane.

13. A computer program product for implementing automated detection as recited in claim 9 includes the step of using said determined ratio of each said calculated effective capacitance and said decoupling capacitance connecting the respective candidate shape to a reference plane to produce a ranked list of the candidate shapes for user review.

14. Apparatus for implementing automated detection of excess shape coupling in printed circuit board (PCB) layouts comprising:

an excess shape coupling detection program for receiving a PCB design file containing an electronic representation of a printed circuit board design; for using said PCB design file for identifying a list of candidate shapes, said candidate shapes disposed on layers adjacent to aggressor planes; for calculating an effective capacitance coupling the candidate shapes to adjacent noise-generating planes; for determining a ratio of each said calculated effective capacitance and a decoupling capacitance connecting the respective candidate shape to a reference plane; for sorting said determined ratios to produce a ranked list of the candidate shapes; and

a user interface for displaying said ranked list of the candidate shapes for user review.

15. Apparatus for implementing automated detection of excess shape coupling as recited in claim 14 wherein said ranked list of the candidate shapes includes shape names with said determined ratio, an area, and a location of the candidate shapes.

16. Apparatus for implementing automated detection of excess shape coupling as recited in claim 14 wherein each said candidate shape has a predefined assigned name indicating usage.